

**UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE**

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: **Woodland/Savannah** (*Pinus edulis/Juniperus monosperma; Juniperus monosperma; Juniperus monosperma/Pinus edulis*)

Site ID: FO35XB004NM

Site Name: Hills or Elevated Plains

Major Land Resource Area and Common Resource Area MLRA 35-NM1

Precipitation or Climate Zone: 12-15 inches

Phase: _____

ORIGINAL SITE DESCRIPTION APPROVAL:

Site Date: January 6, 2006

Site Author: Noe Gonzalez, USDI-BLM, Woodland Ecologist

Site Approval: _____

Approval Date: _____

REVISIONS:

Revision Date: none

Revisor: _____

Revision Approval: _____

Approval Date: _____

Revision Notes: _____

PHYSIOGRAPHIC FEATURES

Narrative:

This representative map unit is on hills and alluvial fans, as well as on higher lying sideslopes on hills. Slope ranges from 2 to 15%. The unit is characterized by fine sandy loam soils, sandy loam, or loamy and generally deep and well drained, although the soil can be shallow in some areas. The alluvium is generally derived from sandstone. Overall, the terrain appears to be gentle rolling hills, with or without distinctive drainage patterns. Aspect can vary, as well as influence diversity and density of vegetation. Areas can be irregular in shape. These map units vary in elevation which also influences species composition and site potential. It does vary from wetter and colder positions on the landscape to drier and lower landscapes, characterized by different species densities and dominance. (Figures 1 through 5 of study plots)

The associated mapping units are similar to Map Unit #340 (MU#340) in several respects but there exist minor differences in elevation, landform, and possibly differences in micro-climate (precipitation & temperature regimes). The associated soils depict the range of variability of the pinon-juniper plant communities in this region. These other soils are likely to react in similar fashion as MU#340 to biological, climatic, and human influences with slight variations due to individual soil characteristics, relative precipitation zones, or their position on the landscape. These differences may be expressed in variations of species composition, (overstory or understory) and tree density.



Figure 1: View of Map Unit 340, Plot #1, gentle gradient $\leq 5\%$ slope. Photo represents tree spacing of mature Pinon pine (Pied) and One-seed juniper (Jumo) trees, the dominant grass species is Blue grama (Bogr). Area has received light fuelwood activity.



Figure 2: View of Map Unit 340, Plot #2, with southwest aspect and 7% slope. Note mistletoe infestation in the tops of the juniper tree, left center of photo.



Figure 3: View of Map Unit 340, Plot #3, southeast aspect, 5% slope. This area is along a flat ridge that leads to Continental divide. Ponderosa pine (Pipo) and Alligator juniper (Jude) can be found in association with Pied/Jumo in this area. Two mature Jude trees are within the plot. The predominant grass species is Bogr with isolated occurrences of Letterman's needle grass, Pine dropseed, Sand Dropseed, and Red threeawn.



Figure 4: View of Map Unit 340, Plot #4, 5% slope with northeast aspect. Site is dominated by Jumo overstory with Bogr understory. Mature trees are widely spaced but mid-aged trees appear to be increasing in the stand. Dead tree in the foreground is fire scarred.



Figure 5: View of Map Unit 340, Plot #5, 12% slope, northeast aspect. Photo depicts a very dense stand of Pied. Site has overlapping canopy of Pied and lesser amounts of Jumo. Mature and over-mature Jumo are widely scattered, mature and mid-aged class Pied trees have filled in the interspaces. Very little to no herbaceous production under the trees, Bogr found in the interspaces with occasional Bottlebrush squirreltail.

LAND FORM:

1. hills

2. alluvial fans

3. slopes

ASPECT:

1. Variable

2.

	Minimum	Maximum
Elevation (feet)	6700	7800
Slope (percent)	2	15
Water Table Depth (inches)	n/a	n/a
Flooding:	Minimum	Maximum
Frequency	n/a	n/a
Duration	n/a	n/a
Ponding:	Minimum	Maximum
Depth (inches)	n/a	n/a
Frequency	n/a	n/a
Duration	n/a	n/a

Runoff Class:

MU340 is a medium runoff class, water erosion hazard is moderate; The associated soil map units have similar runoff capability as well as erosion hazard. A few of the associated soils have rapid runoff and with high erosion potential, while others have slight potential.

CLIMATIC FEATURES**Narrative:**

The weather station used is from Quemado, NM, Catron County. Pie Town and Datil have historical weather data but it is incomplete for its use. Some of the mapping units are in relative proximity to this weather station, although MU#340, along with several others are located to the east of Quemado but within the same climatic regime. Map units, #580, #463, #459, #575 are located east of the Datil Mountains and possibly in a rain shadow effect zone. The following map units (492,493,497,690,670,675,650) are located at lower elevations and may also exist at the lower range of the climatic regime (slightly warmer & drier). Quemado is within climatic division NM-04, Southwestern Mountains. According to Catron County Soil Survey, these soils are within a 12-15 inch average annual precipitation zone. Average annual temperature is 47 to 54 degrees (F). These soils are prone to winter and summer moisture with summer moisture exceeding winter. Summer moisture is usually from convective showers & winter moisture from snow & rain. Frost free days are ≥ 32.5 degrees (F); freeze free days are ≥ 30 degrees (F).

	Minimum	Maximum
Frost-free period (days):	115	130
Freeze-free period (days):	152	214
Mean annual precipitation (inches):	12	15

Monthly moisture (inches) and temperature ($^{\circ}$ F) distribution (Quemado, NM):

	Avg. Precip. In.	Avg. Snowfall Total	Temp. Min.	Temp. Max.
January	0.56	4.3	13.1	46.7
February	0.57	4.0	16.6	50.3
March	0.64	4.7	20.8	56.5
April	0.44	2.1	26.3	65.4
May	0.44	0.2	33.6	74.5
June	0.49	0.0	41.8	84.3
July	2.11	0.0	50.7	85.1
August	2.31	0.0	48.8	82.4
September	1.30	0.0	41.7	78.0
October	0.85	0.5	30.2	69.2
November	0.50	2.0	19.2	57.0
December	0.53	4.6	13.6	48.9

Climate Stations:

	Lat	Long	Period
Station ID 297180 Location	Quemado, 6878'asl	From: 7/1/46 To: 12/31/04	
	34.21'N,108.30'W		
Station ID _____ Location	_____	From: _____ To: _____	
Station ID _____ Location	_____	From: _____ To: _____	

INFLUENCING WATER FEATURES

Narrative:

None, except downslope runoff and slope retention of snow-pack on North slopes.

This unit is not influenced by wetlands or free-flowing streams or seeps.

Wetland description:

System	Subsystem	Class

If Riverine Wetland System enter Rosgen Stream Type:

N/A

REPRESENTATIVE SOIL FEATURES

Narrative:

The representative soil, MU#340 (Flugle-Typic Ustorthent soil, with 2 to 15% slopes) and sample sites are located upon hills and alluvial fans. The Flugle soil component comprises 40% of the map unit with 2 to 15% slopes and contains a fine sandy loam texture. The Typic Ustorthent soil comprises 35% of the unit with 5 to 15% slopes derived from sandstone. Inclusive soils are Manzano and Jacques in swales and rock outcrops on ridges with other Flugle soils occurring, comprising 25% of the map unit.

The Flugle soil is deep and well drained, and formed in alluvium. The Typic Ustorthent soils are shallow to deep and well-drained and derived mostly from sandstone. This map unit has variable slope and aspect characteristics as well as occurring in varying elevations with comparable differences in temperature and precipitation regimes. Some sites are dominated by pinon pine with One-seed juniper as co-dominant, while other sites contain Ponderosa pine and Alligator juniper established along with the pinon and juniper plant community, which is indicative of variant climatic conditions. Lower elevation sites are prone to being drier and dominated by One-seed juniper.

The associated map units range in slope of 1 to 20%, with soils texture as fine sandy loam to gravelly or cobbly loams, found on hills, alluvial fans, slopes and ridges.

Parent Material Kind: Volcanic material or sedimentary

Parent Material Origin: Colluvium or alluvium

Surface Texture:

1. fine sandy loam
2. fine loam
3. sandy loam
4. loam

Surface Texture Modifier:

1. gravelly
2. cobbly

Subsurface Texture Group:	Flugle – sandy loam to sandy clay loam, T.Ustor. – sandy loam to loam
Surface Fragments <=3” (% Cover):	Flugle – none Typic Ustorthents – “A horizon” 0-35% cobbles and pebbles
Surface Fragments >3” (% Cover):	0-35% cobbles
Subsurface Fragments <=3” (% Volume):	Weak fine granular
Subsurface Fragments >=3” (% Volume):	0 to 10% coarse fragments and 0-35% cobbles

	Minimum		Maximum
Drainage Class:	Well	drained	
Permeability Class:	Slow	moderate	Rapid
Depth (inches):	0	-	60
Electrical Conductivity (mmhos/cm):	<2		
Sodium Absorption Ratio:			
Soil Reaction (1:1 Water):			
Soil Reaction (0.1M CaCl2):			
Available Water Capacity (inches):	0.11	0.13	0.16 0.18
Calcium Carbonate Equivalent (percent):			

Soil survey associations:

This ecological site is associated with the map units and soil components in the following soil surveys. Future updates to this soil survey may affect these associations. For up-to-date associations between soil components and this ecological site, refer to NASIS. Associations between ecological sites and soil components are maintained in NASIS via the ecological site ID.

MAP UNIT NAME

<u>Soil survey</u>	<u>Map unit symbol</u>	<u>Soil components</u>	<u>Map unit name</u>
Catron County	#340	40% Flugle 35% Typic Ustorthents 25% Manzano, Jacques, Rock outcrops, Other Flugle	Flugle-Typic Ustorthents association, 2-15% slopes
Catron County	#580	35% Loarc 35% Datil 30% Diatee, Flugle, Manzano, Datil,	Loarc-Datil complex, moist, 2-20% slopes
Catron County	#655	45% Majada 35% Lapdun 20% Amenson, Gustspring	Majada-Lapdun very cobbly loam, 1-8% slopes
Catron County	#335	50% Ralphston 25% Amenson 25% Flugle, Albinas, Dioxice	Ralphston-Amenson loam, 1-9% slopes.
Catron County	#341	45% Flugle 35% Jacques 20% Loarc and Manzano	Flugle-Jacques association, 1-5% slopes
Catron County	#366	70% Celsosprings Stony loam 30% Celsosprings loam, Thunderbird, and Cabezon	Celsosprings stony loam, 1-8% slopes
Catron County	#463	35% Datil 35% Dioxice 30% Motoqua, Faraway	Datil-Dioxice association, moist 3-15% slopes
Catron County	#482	40 % Datil 35% Guy 25% Gustspring, Loarc, Guy rock, Manzano	Datil-Guy association, 3-15% slopes
Catron County	#492	40% Jacee loam 20% Celacy 20% Rock outcrop 20% Catman, Jacques, Flugle, Royosa, Mion, Travessilla,	Jacee-Celacy-Rock outcrop, 0-9% slope
Catron County	#575	50% Joachem 30% Rock outcrop 20% Motoqua, Abrazo, Apache	Joachem –Rock outcrop complex, 3-15% slopes
Catron County	#585	35% Abrazo 30% Apache 35% Datil, Motoqua, Rock outcrop	Abrazo-Apache complex, 2-15% slope
Catron County	#650	30% Typic Ustorthents 30% Hickman 15% Majada 25% Manzano, Pie town, Rock outcrop	Typic Ustorthents-Hickman-Majada association, 1-25% slopes
Catron County	#670	40 % Diatee 35% Flugle 25% Gustspring, Loarc, Manzano	Diatee-Flugle association, 1-9% slope

<u>Soil survey</u>	<u>Map unit symbol</u>	<u>Soil components</u>	<u>Map unit name</u>
Catron County	#675	40% Loarc 30% Flugle 20% Manzano 10% Ralphston	Loarc-Flugle-Manzano, 1-9 %
Catron County	#690	45% Millpaw 45% Datil 10% Albinas, Manzano	Millpaw-Datil complex, 0-7 % slope
Catron County	#700	35% Hiarc 25% Loarc 20% Typic Ustorthents 20% Manzano, Rock outcrops	Hiarc-Loarc-Typic Ustorthents association, 1-9% slopes
Catron County	#459	85% Telescope loamy fine sand 15% Augustine, Manzano	Telescope loamy fine sand, 3-10% slopes
Catron County	#493	35% Mion 25% Travessilla 20% Rock outcrop 20% Badland, Celacy, Flugle, Jacee, Catman, Hickman	Mion-Travessilla-Rock outcrop complex, 2-30% slopes
Catron County	#497	80% Royosa 20% Celacy, Sandstone outcroppings, Travessilla	Royosa fine sand, 3-15% slope

PLANT COMMUNITIES

Ecological Dynamics of the Site:

Many of the soil map units, including the reference site (MU#340), are complex soils comprised of a mixture of soil types. MU#340 has not been classified into an Ecological Site Description (ESD), as well as #366, #492, #497. Portions of the remaining mapping units have been classified in an ESD as hills, savannah, gravelly, swale, basalt hills, stony loam, shallow sandstone, or deep sand. The remaining range sites have varying densities of pinon and juniper present. In many instances the trees found upon those sites are in moderate to high density and many exhibit a very old age class, indicating that woodland trees were a prominent feature upon the landscape. This ESD does not address swale, lowlands, or any other range site classed as a grassland dominated plant community, though woodland species may be found upon such sites in very low densities, that is, extremely widely scattered trees with a spacing of 100+ feet.

The existing condition on many of these mapping units is characterized as follows: Moderate to high tree densities exist; Pinon pine dominates most stands by frequency and canopy cover; map units are comprised of an uneven-aged stand of trees; pinon pine seedlings/saplings surpass those of juniper; herbaceous cover exhibits minimal plant diversity; many of the sites contained dwarf mistletoe infestations and varying levels of mortality in the pinon trees; all sites were found on hills, slopes, elevated plains, or ridges; and fire scars were typically found only on One-seed junipers (old trees). The following map units were sampled to collect data on tree density, canopy cover, basal area, composition, and age structure: MU# 340, 335, 580, and 655. Overall, Pinon pine dominated stands, at 54% of composition by frequency and an average of 58% based on canopy cover. The age structure is dominated by *Jumo* (One-seed juniper) in the old tree age class on most sites with Pinon dominating the mid-aged class, indicating a transition to pinon dominated stands. It appears that Pinon may be shorter lived than Juniper due to greater susceptibility to adverse conditions (climate, disease infestations, soil productivity). Juniper on the other hand is long-lived and appears to be the mainstay in many of these woodland/savannah plant communities.

There is variation in plant community structure when addressing the woodland characteristics of all the map

units associated with this ESD. This ESD addresses those map units with less than 25% slope to nearly level ground, rolling terrain (slopes, hills, elevated plains, ridges) and generally soils comprised of alluvium or colluvium derived material. Exposed bedrock or rock outcrops would be small inclusions or anomalies which are not directly associated with this ESD. Overstory vegetation could vary from the minor inclusions of Ponderosa pine and alligator juniper at the upper range of this ESD (ie: MU 340, 341) to One-seed dominated plant communities (ie: MU 650) at the lower end of this ESD. These differences are primarily driven by topography, elevation, aspect, or moisture variations, or a combination of all factors. It's possible that an ESD could be developed for more site-specific detail, although in general terms, given the overall elevation, temperature, and precipitation range, the plant communities upon these soils would likely react in the same manner to biotic or abiotic influences resulting in relatively similar plant composition, densities, and successional pathways.

There are "3" states and up to 4 plant communities within those states. The states are described as follows: Historical Climax Plant Community (HCPC), State #1; Existing plant community (State #2) which is representative of the potential natural community (PNC) with some level of grazing and having variations in pinon or juniper density; and an Early Seral State, State#3, which is a grassland dominated state. Grazing is not considered a part of the HCPC but other natural processes such as fire, drought, disease, and wildlife impacts are. These same influences also occur in State 2, with mechanical treatment as the primary source of change in State 3. A catastrophic fire may occur in States 1 and 2 as a wind-driven anomaly resulting in total reduction of the canopy cover, subsequently transitioning to State #3, a grassland landscape.

Overall, the common disturbances that affect the P/J in these map units are drought, disease, fire, excessive moisture, land treatment practices, and livestock grazing. Fire and drought would be common occurrences in the historical plant community and would regulate tree density and recruitment, as well as herbaceous/shrub plant composition and distribution. The other disturbances would be more prevalent in the PNC and early seral states of the P/J communities. Over grazing would contribute to the reduction or elimination of natural fire cycles by removing all fine fuels. A broken fire cycle allows for high moisture periods to benefit P/J seedling establishment and survival and eventually an increase tree density. Drought, disease, and land treatment practices are disturbances that aid in re-setting the plant community, substituting for natural fire occurrences to a limited extent.

Understory vegetation in the historical plant community and well managed grazing plant communities generally would have a greater mix of cool and warm season herbaceous vegetation, as well as a greater diversity in shrub species. In the heavily grazed plant communities, high tree density exists with almost a monoculture of blue grama along with invasive plants or annuals. Very few shrubs species are present, usually in decadent forms.

Site indices (based on tree diameter in relation to basal area) for these sites are typically rated at a "2", although drier sites rate at a "3".

The Historic Plant Community would consist of old growth trees dominating the site comprising 70 to 80% of the stand, Mid-age trees would comprise 20-25%, and young age classes (seedlings/saplings) comprise 0-10% of the stand. The young age class could be virtually non-existent in some isolated areas due to re-occurring low intensity natural fires. Mature trees would be long-lived, large diameter, and few, if any, dead trees present.

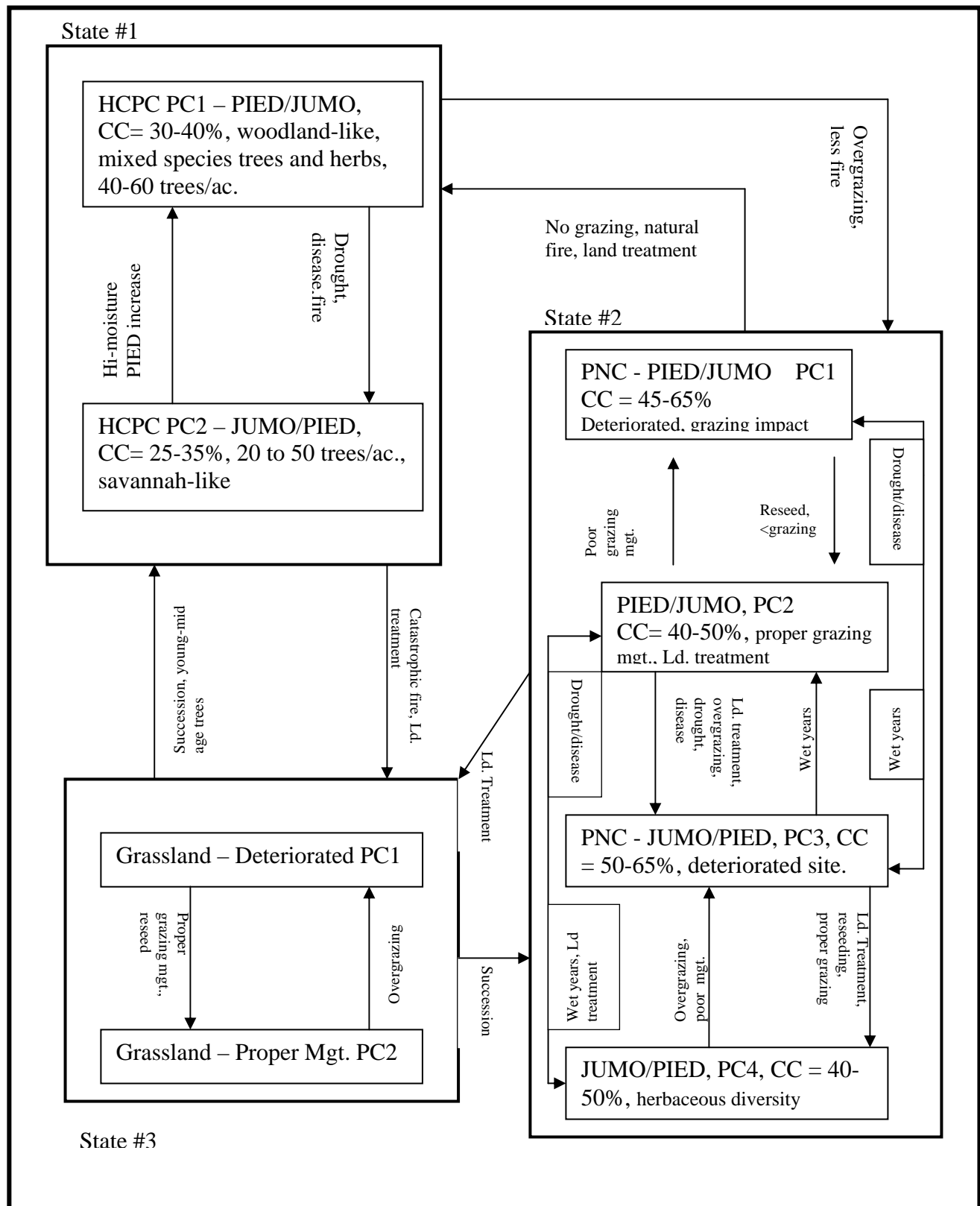




Figure 6: View of Map unit #580, large diameter One-seed juniper trees are present indicating a mature stand with increasing younger age classes. Old growth Jumo trees are widely spaced, dominant grass is Bogr with some Red threeawn.



Figure 7: View of old-growth Jumo and Pied trees within Map unit #580.



Figure 8: View of Map unit #580, Plot #1. Widely spaced Jumo in the stand, over-mature Jumo tree in the center of photo, measures 48” inches diameter at root crown. Dominant grass species is Bogr.



Figure 9: View of Map unit #580, Plot #2. Plot photo represents the potential for dense stands to occur within the map unit.



Figure 10: View of fire scarred Jumo tree adjacent to Plot #2, MU#580. Scars are located between 4 to 6 feet above ground. No scars found at the base of tree, suggesting that the tree was burned at an early age without adversely affecting its growing capability.



Figure 11: View of Plot #1, Map unit #335, southeast aspect, 4% slope. Jumo dominates overstory, Jumo old trees are widely scattered, Pied species is increasing in the stand with younger age classes. Bogr is dominant grass species.



Figure 12: View of Plot #2, Map unit #335, northwest aspect, 5% slope. Pied dominates overstory, old trees being widely scattered. Bogr is dominant grass species.



Figure 13: General view of treated area, Map unit #335, adjacent to Plot #1. Area is dominated by Bogr, with lesser amounts of Bottlebrush squirreltail, Red threeawn, and Sand dropseed. Dominant shrub species are Rabbitbrush with some occurrences of Horsebrush. Younger age-class of Pied and Jumo is increasing in the treated area.



Figure 14: View of Plot #1, Map unit #655, northeast aspect, 5% slope, with old Jumo trees widely scattered as a common occurrence. There are lesser amounts of Pied in the stand. Pied is increasing due to younger age classes being more common under the canopy cover. Jumo dominates overstory with an older age class. Bogr is dominant grass species.



Figure 15: View of Plot #2, Map unit #655, northeast aspect, 3% slope. Site is dominated by mature Pied trees, very few Jumo trees present. Bogr is dominant grass species.



Figure 16: View of Plot #3, Map unit #655, northeast aspect, 4% slope. Site is dominated by mature Pied trees, with stand structure being moderately dense. Very little regeneration observed in the stand. Substantial evidence in surrounding area of Pied mortality, probably due to drought stress and beetle infestation. Bogr is dominant grass species.



Figure 17: General view of Map unit #655, adjacent to Plot #3. Photo depicts tree density and spacing as well as drought/disease effect on Pied component. Bogr is dominant grass species with Broom snakeweed in foreground.



Figure 18: General view of fence line contrast of Map unit #655. The untreated woodland/savannah on left is BLM land, the treated area on right is US Forest Service lands. Soils survey on USFS lands are mapped differently than on BLM land (NRCS soil survey), but essentially the soils are similar on both sides of the fence. This flattop ridge was treated by manual fuel wooding with slash lopped and scattered. Herbaceous plants appeared to have increased in vigor but not able to ascertain if plant density has increased.

Description of State and Transition Model

The description of the states and transitions are as follows:

State #1, Historical Climax Plant Community (HCPC): This state reflects a plant community structure not influenced by grazing or other human activity. Natural processes would occur such as, drought and disease mortality, natural fire events (both low and high intensity), and natural regeneration from favorable moisture periods. Plant Community #1 would be dominated by Pinon pine with One-seed juniper as co-dominant. Canopy cover would be expected at approximately 30 to 40%; landscape portrays a woodland appearance with a mixture of tree species, including occurrences of Rocky Mountain or Alligator juniper, with incidental occurrences of Ponderosa pine. A diverse mixture of herbaceous understory would also persist, comprised of both cool and warm season species bunchgrasses and forbs. Some shrubs may also express themselves such as mountain mahogany, Four-wing saltbush, Skunkbush, and winterfat. Tree density may range between 40 to 60 trees per acre. Typically an older age class would dominate the stands with large diameter trees common. Natural fire would tend to suppress regeneration to very few survival trees. A variation may occur at lower elevation and precipitation range (warmer /drier sites) for this ESD, whereas Pinon pine and One-seed juniper may be the only trees species present and Ponderosa pine, Alligator and Rocky mountain junipers may not occur at all. Plant Community #2 is dominated by One-seed juniper and pinon pine would be a co-dominant or subdominant species (<33% in composition) such as in Map unit #650. This plant community would have more of a savannah-like appearance, with trees widely scattered and more open canopy, range about 25 to 35% canopy cover. Tree densities may range between 20 to 50 trees per acre. This plant community would result from drought, disease, or

natural fire effects upon PC#1, reducing the amount of pinon trees in the stand. This plant community could revert to PC#1 through succession and brought about by high moisture periods and increases in pinon pine density.

State #2, Potential Natural Community (PNC): State 1 would transition to State 2 as a result of over grazing and reduction in fire occurrences. This in turn would result in an overall increase in tree density and canopy cover and may have variable effect on understory species composition. Plant Community #1 would be the PNC with heavy grazing impact and poor range management practices, similar to existing conditions. The site would be considered deteriorated and would have a high density of pinon pine. One-seed juniper would be sub-dominant in terms of frequency and canopy cover. Canopy cover would range between 45 to 65%. Blue grama grass would be the dominant grass species, although forage production could be very low, 100 to 200 #/acre. Plant Community #2 could result from PC1 by implementing improved grazing management (extended rest, deferment, reduced stocking rates), reduction in grazing intensity (less than 35% actual use on forage plants), land treatments (reduction in trees, mechanical, herbicide, fuelwooding and reseeded). Pinon pine could still dominate but one-seed juniper may become co-dominant making up 35 to 45% of the tree composition. Canopy cover could range between 40 to 50%. Herbaceous cover could be diverse as in HCPC but at reduced amounts and distribution.

Plant Community #3 would result from PC1 or PC2 due to effects of drought, disease (reducing pinon density), and overgrazing. The site would remain deteriorated with Blue grama dominating the understory but at a lower production level, 50 to 150#/acre. One-seed juniper would dominate and pinon pine would be sub-dominant (<33% in composition). Canopy cover would increase to 50 to 65%, or more. Plant Community #4 could also result from PC2 due to drought and disease effects or from PC3 as a result of improved grazing management and land treatment practices.

State #3, Early seral state: State #3 could result from State 1 or 2 due to a catastrophic fire event or some form of land treatments that removes virtually all of the tree canopy cover. Two possible plant communities could exist. Plant Community #1 would be a deteriorated site resulting from heavy livestock grazing and likely dominated by blue grama, along with rabbitbrush or horse brush. Some secondary herbaceous plants may also be present, such as, Red threeawn, Sand dropseed, Bottlebrush Squirreltail, Globe Mallow, Fringed sagewort, Buckwheat to name a few. Occasional plants of Four-wing saltbush, wolfberry, and skunkbush may be found as well. Plant Community #2 would result from improved grazing management practices (extended rest and deferment, reduced stocking levels, lighter grazing intensity, and reseeded). This plant community would exhibit a mixture of native cool and warm season species, such as, western wheatgrass, junegrass, spike muhly, stipas, Indian ricegrass, galleta, sideoats grama, bluestems, mutton grass, as well as four wing saltbush, winterfat, and mountain mahogany.

Interpretive Plant Community: Four soil map units were sampled to determine stand density, age structure, and tree species dominance (by frequency and canopy cover). This data was used to estimate HCPC plant composition and stand structure. The data was summarized and collectively used to estimate successional pathways as well. The four map units sampled are #340, 580, 335, and 655, with a total of 10 plots sampled, varying in aspect and elevation.

Ground Cover and Structure: (as it exist today)

Cover Type	Percent Ground Cover by Height Class (feet)								
	<.5	.5-1	>1-2	>2-4.5	>4.5-13	>13-40	>40-80	>80-120	>120
Grass/Grass Like		14							
Forb		T							
Shrub/Vine				T					
Tree						<4			
Lichen	T								
Moss	T								
Litter	24								
Course Fragment	14								
Bare Ground	44								

** NOTE: Ground Cover equals Basal Cover

Forest Overstory Composition:

The typical forest overstory composition of the historic climax community.

Common Name	Scientific Name	Percent Composition (percent by frequency)
Pinon Pine	<i>Pinus edulis</i>	56%
One-seed Juniper	<i>Juniperus monosperma</i>	44%
Others: Ponderosa pine, Alligator Juniper , Rocky Mnt. Juniper	<i>Pinus ponderosa</i> , <i>Juniperus</i> <i>depeana</i> , <i>Juniperus</i> <i>scopulorum</i>	Trace to <5%

Forest Understory Composition:

The typical annual production of understory species to a height of 4.5 feet (excluding boles of trees) under low, high, and representative canopy covers.

Common Name	Scientific Name	Annual Production Per Acre Range in Pounds (air-dry weight)					
		Canopy Cover Percent					
		Early Seral <15%		PNC 65%		HCPC 40%	
		lbs	lbs	lbs	lbs	lbs	lbs
Blue grama	<i>Bouteloua gracilis</i>	300	500	200	240	250	400
Red threeawn, Ring Muhly, Mat Muhly	<i>Aristida longesita</i> , <i>Muhlenbergia torreyi</i> , . <i>Muhlenbergia richardsoni</i>	10	20	1	10	0	5
Mallow spp., Jame's buckwheat	<i>Sphaeralcea</i> , <i>Eriogonum jamesii</i>	10	15	1	5	5	10
Bottlebrush squirreltail	<i>Elymus elymoides</i>	1	20	1	10	10	15
Spike Muhly, Mountain Muhly	<i>Muhlenbergia wrightii</i> , <i>Muhlenbergia montanus</i>	1	10	1	5	1	15
Needle & thread, NM feathergrass, Letterman's needlegrass	<i>Hesperostipa comota</i> , <i>Hesperostipa neomexicana</i> , <i>Hesperostipa lettermani</i>	1	15	1	10	15	20
Prairie junegrass, Mutton bluegrass, Indian ricegrass, Littleseed ricegrass Pinyon ricegrass, Wolftail, Pine dropseed	<i>Koeleria macrantha</i> , <i>Poa fendleriana</i> , <i>Oryzopsis hymenoides</i> , <i>Piptatherum micranthum</i> , <i>Piptochaetium fimbriatum</i> , <i>Lycurus phleoides</i> , <i>Blepharoneuron tricholepis</i>	1	10	1	5	15	25
Western wheatgrass, Little bluestem, Galleta	<i>Pascopyrom smithii</i> , <i>Schizachrium scoparium</i> , <i>Pleuraphis jamesii</i>	10	15	1	5	5	10
Winterfat, Four-winged saltbush, Skunkbush, Mountain mahogany	<i>Kracheninnikovia lanata</i> , <i>Atriplex canescens</i> , <i>Rhus trilobata</i> , <i>Cercocarpus montanum</i>	25	50	1	25	25	35
Broom snakeweed	<i>Gutierrezia sarothrae</i>	10	20	1	20	1	10
Carruther's sage, Four o'clock	<i>Artemisia carruthii</i> , <i>Mirabilis spp.</i>	5	10	1	10	0	5
Sand dropseed, Arizona threeawn Spcr, Arar	<i>Sporobolus cryptandrus</i> , <i>Aristida arizonica</i>	5	10	1	5	1	5
Other shrubs	<i>Artemisia frigida</i> , <i>Lycium spp.</i> , <i>Ribes spp.</i> <i>Yucca baccata</i> , <i>Opuntia spp.</i> , <i>Ericameria nauseosa</i> , <i>Tetradymia canescens</i> , <i>Quercus turbinella</i>	50	75	1	20	5	10
Total Annual Production		429-770		212-370		333-565	

Typical Climax Community:

Woodland/Savannah plant communities may be dominated by either Pinon pine or One-seed juniper, depending either on aspect, elevation, topographic position, or localized moisture regime. Typically, the lower elevational range would normally be dominated by Juniper, with the upper range dominated by pinon pine. At the HCPC, older age class trees would dominate in the stand, with mid-aged class trees as secondary in dominance and young or seedling/saplings comprising a small percentage in density. Recruitment into the stands would be minor with young age classes found at the base of very old trees or at the edge of the drip line of existing older trees. Older age trees would be characterized as being tall, with wide crowns, very large DRCs (Pied=18+", Juniper 30+"). Trees would be widely spaced averaging about 37' feet apart with about 32 trees per acre due to naturally occurring fires and an abundant amount of fine fuels to clear younger age classes and elevate the crowns on some trees. In some areas it may be evident that Ponderosa pine, alligator juniper may be found in the stands in very small quantities. Shrub density could vary as well, depending on the fire frequency and fire resistance of the species. Shrubs would generally appear to be vigorous and large in height and diameter.

The understory would be comprised of a mix of cool and warm season species. Cool season species would be typically found adjacent to or underneath tree canopy, and warm season species would be found in the interspaces between trees. Ground cover would likely be high from vegetation and litter, and herbaceous plants would be vigorous. Forage production range could be between 333-565#lbs/acre.

HCPC canopy cover would range between 30-40% for Pinon dominated stands and 25-35% for One-seed juniper dominated stands. Canopy cover may be even less at the lower elevation range with homogenous Juniper stands. Fire intervals may be between 10 (with greater herbaceous cover) to 30 year (with less or varying herbaceous cover) interval range due to the likelihood of extended drought periods and variable herbaceous species composition after drought recovery. (Reference: USDA Forest Service, General Technical Report #42, Volume 2).

Fire interval could be extended out to 50+ years given changes in understory plant density. Crown fires would not be expected in the HCPC stand due to moderately open canopy. Small canopy burns (< 1 acre in size) may occur due to instances of infrequent ladder fuels and prominence of packrat mittens occurring within the stands, usually at the base of juniper trees.

Plant Community: (as it exists today)

The existing plant community is characterized as the PNC with existing land uses and minimal to non-existent fire regime. Broadcast fire events do not occur in the existing plant community due to lack of fine fuels and ladder fuels. Trees are closely spaced together and may range in spacing of 14 to 23 feet. Any fire event may be of a direct lightning strike on individual trees that may have accumulated duff or packrat nest at the base of the tree as a source of fuel. Canopy closure on the average is about 49%. Herbaceous production is very low, generally about 256#lbs/acre for all species. Blue grama comprises 86% of the herbaceous production. Mid-aged and young age classes are common in the stands, and may exceed older age class trees in density (numbers of trees per acre). In the lower elevation, as tree densities increase, the occurrence of pinon pine becomes more evident and may become more dominant than One-seed juniper due to increasing canopy closure. These areas are prone to large die-offs of pinon pine due to drought stress and disease. At the upper elevations, the higher tree densities would allow greater frequency of Ponderosa pine and Alligator juniper to occur due to change in microclimate. Herbaceous cover is thin and discontinuous and most cool season species are nonexistent or are incidental remnants.

Ground Cover and Structure: (HCPC projection)

Cover Type	Percent Ground Cover by Height Class (feet)								
	<.5	.5-1	>1-2	>2-4.5	>4.5-13	>13-40	>40-80	>80-120	>120
Grass/Grass Like		27							
Forb		2							
Shrub/Vine				T					
Tree						<2			
Lichen	T								
Moss	T								
Litter	30								
Course Fragment	14								
Bare Ground	25								

** NOTE: Ground Cover equals Basal Cover

Forest Overstory Composition:

The typical forest overstory composition of the historic climax community.

The typical forest overstory composition of the historic Chinaman community.		
Common Name	Scientific Name	Percent Composition (percent by frequency)
Total		

Forest Understory Composition:

The typical annual production of understory species to a height of 4.5 feet (excluding boles of trees) under low, high, and representative canopy covers.

[illegible]

Plant Community: (as it exists today)

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ECOLOGICAL SITE INTERPRETATIONS**Forest Site Productivity**

Common Name	Scientific Name	Annual Productivity (per acre per year)						
		Site Index		Cubic Feet (CMAI)		Other Units		
		Low	High	Low	High	Low	High	Unit

Soil Survey Associations:

This ecological site is associated with the map units and soil components in the following soil surveys. Future updates to this soil survey may affect these associations. For up-to-date associations between soil components and this ecological site, refer to NASIS. Associations between ecological sites and soil components are maintained in NASIS via the ecological site ID.

		Map Unit Name
<u>Soil Survey</u>	<u>Map Unit Symbol</u>	<u>Soil Components</u>
Catron County, NM	340	Flugle-Typic Ustorthents association, 2-15% slopes
	580	Loarc-Datil complex, moist, 2-20% slopes
	335	Ralphston-Amenson loam, 1-9% slopes.
	655	Majada-Lapdun very cobbly loam, 1-8% slopes
	341	Flugle-Jacques association, 1-5% slopes
	366	Celsosprings stony loam, 1-8% slopes
	463	Datil-Dioxice association, moist 3-15% slopes
	482	Datil-Guy association, 3-15% slopes
	492	Jacee-Celacy-Rock outcrop, 0-9% slope
	575	Joachim –Rock outcrop complex, 3-15% slopes
	585	Abrazo-Apache complex, 2-15% slope
	650	Typic Ustorthents-Hickman-Majada association, 1-25% slopes
	670	Diatee-Flugle association, 1-9% slope
	675	Loarc-Flugle-Manzano, 1-9 %
	690	Millpaw-Datil complex, 0-7 % slope
	700	Hiarc-Loarc-Typic Ustorthents association, 1-9% slopes
	459	Telescope loamy fine sand, 3-10% slopes
	493	Mion-Travessilla-Rock outcrop complex, 2-30% slopes
	497	Royosa fine sand, 3-15% slope

ECOLOGICAL SITE INTERPRETATIONS

Animal Community:

These areas are grazed by livestock. Slopes are gentle enough to allow livestock unlimited access over most of the terrain. There are no naturally occurring water sources (springs or streams) in any of the map units. Livestock use depends on the development of man-made watering facilities (wells or stock tanks). Livestock have been in various parts of these map units for over a century and their influence on the land and vegetation is evident (decreased herbaceous plant diversity, sheet or gully erosion, broken fire cycle, lack of fine fuels for natural occurring fires). Currently stocking capacity for these map units is low due to low production of almost a homogenous stand of blue grama grass. Plant diversity could be sustained through all three states if livestock are managed properly, reduced stocking rates, planned grazing systems that afford substantial growing season rest and recovery after a grazing event, and re-introduction of fire into the ecosystem for nutrient cycling and maintain an open canopy level. The deteriorated condition in the woodland/savannah plant communities (States 2 and 3) requires a substantial amount of effort to rebuild the plant community structure and diversity while livestock grazing is ongoing.

Wildlife such as deer and elk utilize these areas for forage, escape cover, and thermal cover. It has been observed that cool season species are most utilized by wildlife during fall, winter, and early spring. Competition for forage between livestock and wildlife can occur within these mapping units, especially in regard to cool season grasses and shrubs.

Plant Preference by Animal Kind:

Animal Kind: Livestock

Animal Type: Cattle

Common Name	Scientific Name	Plant Part	Forage Preferences											
			J	F	M	A	M	J	J	A	S	O	N	D
Blue grama	<i>Bouteloua gracilis</i>	EP	D	D	D	D	D	D	P	P	P	D	D	D
B. squirreltail	<i>Elymus elymoides</i>	EP	C	C	P	P	C	C	C	C	C	D	D	C
Wolftail	<i>Lycurus phleoides</i>	EP	S	S	S	D	D	D	P	P	P	P	S	S
Western wheatgrass	<i>Pascopyrom smithii</i>	EP	C	C	P	P	D	D	D	D	P	P	P	C
Muhly – Spike & Mountain	<i>Muhlenbergia</i> spp.	EP	C	C	D	D	D	P	P	P	P	C	C	C
Prairie Junegrass	<i>Koeleria macrantha</i>	EP	D	P	P	P	D	D	D	D	P	P	P	D
Mutton bluegrass	<i>Poa fendleriana</i>	EP	P	P	P	P	D	D	D	D	D	P	P	P
Stipa spp.	<i>Hesperostipa comata</i> , <i>neomexicana</i> , & <i>lettermani</i>	EP	C	P	P	P	S	S	S	S	D	D	D	C
Galleta	<i>Pleuraphis jamesii</i>	EP	D	D	D	D	D	D	P	P	P	P	D	D
Little bluestem	<i>Schizachrium scoparium</i>	EP	S	S	S	S	D	D	P	P	P	S	S	S
Ricegrass, Littleseed & pinon	<i>Piptatherum micranthum</i> <i>Piptochaetium fimbriatum</i>	EP	D	D	P	P	P	D	D	D	D	P	P	D
Shrubs	<i>Kracheninnikovia lanata</i> , <i>Atriplex canescens</i> , <i>Rhus trilobata</i> , <i>Cercocarpus montanum</i>	EP	D	D	P	P	P	D	D	D	P	P	P	D

Animal Kind: Wildlife

Animal Type: Elk

Common Name	Scientific Name	Plant Part	Forage Preferences											
			J	F	M	A	M	J	J	A	S	O	N	D
Blue grama	<i>Bouteloua gracilis</i>	EP	D	D	D	D	D	D	P	P	P	D	D	D
B. squirreltail	<i>Elymus elymoides</i>	EP	S	D	D	D	S	S	S	S	D	D	S	S
Wolftail	<i>Lycurus phleoides</i>	EP	C	C	C	C	C	C	C	C	C	C	C	C
Western wheatgrass	<i>Pascopyrom smithii</i>	EP	C	D	P	P	D	S	S	S	D	D	C	C
Muhly – Spike & Mountain	<i>Muhlenbergia</i> spp.	EP	C	C	D	D	C	C	D	D	D	C	C	C
Prairie Junegrass	<i>Koeleria macrantha</i>	EP	D	P	P	P	D	D	D	D	P	P	P	D
Mutton bluegrass	<i>Poa fendleriana</i>	EP	P	P	P	P	D	D	D	D	D	P	P	P
Stipa spp.	<i>Hesperostipa comata</i> , <i>neomexicana</i> , <i>lettermani</i>	EP	C	D	P	P	S	S	S	S	S	D	D	C
Galleta	<i>Pleuraphis jamesii</i>	EP	C	C	D	D	C	C	C	D	D	D	C	C
Little bluestem	<i>Schizachrium scoparium</i>	EP	S	S	S	S	S	S	D	D	D	S	S	S
Ricegrass, Littleseed & pinon	<i>Piptatherum micranthum</i> <i>Piptochaetium fimbriatum</i>	EP	D	D	P	P	P	D	D	D	D	P	P	D
Shrubs	<i>Kracheninnikovia lanata</i> , <i>Atriplex canescens</i> , <i>Rhus trilobata</i> , <i>Cercocarpus montanum</i>	EP	D	P	P	P	D	D	D	D	P	P	D	D

Plant Preference codes:

<u>Plant Part</u>	<u>Code</u>	<u>Species Preference</u>	<u>Code</u>
Stems	S	None Selected	S
Leaves	L	Preferred	P
Flowers	F	Desirable	D
Fruit/Seeds	F/S	Undesirable	U
Entire Plant	EP	Not Consumed	C
Underground parts	UP	Emergency	E
		Toxic	T

Hydrology Functions:

The course fragments occur in very minimal amounts, except on a few soil map units. Soils are either sandy loam or fine sandy loam. A few soils contain gravelly, cobbly, or stony surface textures. Most soils are well drained and allows for water to filter through the profile and recharge the water table. Excessive moisture does contribute toward surface flow and subsequent soil erosion (sheet or gully).

Several of the soil map units do not have well defined drainage patterns and springs or sustained stream flows are not expected to occur on these soils map units. Some of the soils have very good water holding capacity while others do not. The soils that are deeper, at higher elevation and precipitation zones have the ability to produce greater tree densities and larger diameter trees. Whereas, other sites at lower elevation appear to be harsher (shallow soil or drier) resulting in stunted growth form of the trees.

Recreational Uses:

These map units collectively are conducive to recreational opportunities such as camping and firewood gathering. The woodland/savannah plant communities also provide thermal and nesting cover for wildlife and may provide hunting opportunities at certain times of the year. Most map units are not steep terrain, and readily accessible to vehicles or off road vehicles. There is sufficient grade on the landscape that proper road placement and construction would be prudent to avoid accelerating soil erosion. Scenic values are not that high, and changing the vegetative patterns across the landscape would not change the scenic rating that significantly.

Wood Products:

Many of the sites produce a substantial amount of wood fiber, both at the HCPC or at the PNC deteriorated state levels. The map units are readily accessible making them a good source for both commercial and personal use firewood gathering. The sites also produce sufficient seedling, saplings at State 2, which may provide an opportunity for commercial harvesting of root stock for commercial landscaping. Some sites may produce up to “2” cords of firewood per acre per year, based on a 150 year rotation cycle, harvesting only the old growth age class trees in the stand.

Wood posts and stays could also be derived from the woodland/savannah plant communities but the volume and quality may vary significantly between soil map units due to varying height, density, and age class of trees across the landscape. Few of the One-seed juniper are straight enough for post, but generally good enough for stays. Limited amounts of Alligator and Rocky Mountain juniper are available on certain soil map units (MU340, 341, 700) but harvesting opportunities may be restricted by the lack of sustained volume.

Other Products:

In areas where Ponderosa pine exists as an anomaly in the stands, selective cutting could provide additional fire wood volume, as well as incidental saw timber or vigas for commercial sale. The potential revenues drawn from the sale of the trees may not substantiate the cost for creating access to remove the trees as well as the added soil disturbance associated with road building and harvesting. Ponderosa pine trees do serve as raptor and cavity nesting platforms in addition to providing a vegetative diversity on the landscape.

Other Information:

Historical and current grazing impacts have significantly altered the plant composition on many of the soil mapping units. Restoration efforts will entail a long-term recovery process to restore the native plant structure in any of the States desired. Reseeding will be an integral part of the recovery process

Supporting InformationAssociated Sites:

<u>Site Name</u>	<u>Site ID</u>	<u>Site Narrative</u>
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Similar Sites:

<u>Site Name</u>	<u>Site ID</u>	<u>Site Narrative</u>
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Inventory Data References (narrative):

This ESD is derived from interpretation of 4 selected study sites within different soil mapping units. The four soil mapping units analyzed were #340, 335, 580, 655, all occurring on BLM lands. Fixed study plots were measured in each of the study sites as well as understory vegetation sampling conducted in association with the study plots. MU#340 contained 5 study plots, MU#335 and #580 contained two study plots each, and MU#655 contained three study plots. The data gathered was summarized and averaged to extrapolate it's relevance across all of the remaining soil mapping units considered in this ESD.

Each study plot had one 0.1 acre plot measured and the data summarized per study site. Sites were not selected randomly. They were selected based on best representation of the landscape and to maintain consistency within the soil mapping unit. A photographic record of each site is displayed in the preceding figures and also maintained in the case file with field data forms.

Inventory Data References:

<u>Data Source</u>	<u>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
BLM, NMSO	12	Spring and Summer 2005	NM	Catron

State Correlation:

This site has been correlated with the following sites: No other states have collected data in woodland type.

Type Locality:

State: _____

County: _____

Latitude: _____

Longitude: _____

Township: _____

Range: _____

Section: _____

Is the type locality sensitive? Yes ☐ No ☐

General Legal Description: _____

Relationship to Other Established Classifications:

The understory vegetation was compared to existing ESDs: Savannah (R036XB127NM); Hills (R036XB124NM); Sandstone Hills (R036XB122NM); Gravelly (R036XB114NM). The overstory plant community was compared to information developed for the Zuni Reservation: Juniper woodland (F036XB002NM); Pinyon/Juniper woodland (F036XB001NM).

The understory vegetation, in almost all of the mapping units visited, were dominated by Blue grama. The above ESDs were used to estimate potential plant community structure for this ESD at the HCPC as well as the other states. The Savannah and Hills appeared to be most comparable to the plant communities encountered. Remnant species were found in some of the plant communities suggesting that their existence in the plant community may have been altered over time. Both forest ESDs provided suggestions in stand structure and succession.

Other References:

USDA Forest Service, General Technical Report #42, Volume 2; *Wildland Fire in Ecosystems – Effects of fire on Flora*, December 2000.

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USDA-NRCS, Soil Survey for Catron County, NM, North Part, W. Ralph Johnson, May 1985.

USDA Forest Service, General Technical Report XX, *Disturbance and Climate Change in United States/Mexico Borderland Plant Communities – A State-of-the-Knowledge Review*; Guy R. McPherson and Jake F. Weltzin, April 2000.

Historical Weather data for Quemado, NM and Pie Town, NM, Western Regional Climate Center, Reno, Nevada.

Juniper Growth Table, Physical Characteristics and Utilization of Major Woodland Tree Species, Table 26, Barger and Folliot, 1972.

Regional Bulletin #71, Culmination of Mean Annual Increment, USDA 1940.